



X-RAY ASTRONOMY 2019

Current Challenges and New Frontiers in the Next Decade

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AstroSat observation of GX 5-1: Spectral and timing evolution

We report on the first analysis of AstroSat observation of the Z-source GX 5-1 on February 26-27, 2017. The hardness-intensity plot reveals that the source traced out the Horizontal and Normal branches. The 0.8-20 keV spectra from simultaneous SXT and LAXPC data at different locations of the hardness-intensity plot can be well described by a disk emission and a thermal Comptonized component. The ratio of the disk flux to the total i.e. the disk flux ratio increases monotonically along the horizontal to the Normal one. Thus, the difference between the Normal and Horizontal branches is that in the normal branch, the disk dominates the flux while in the horizontal one it is the Comptonized component which dominates. The disk flux scales with the inner disk temperature as $T^{5.5}$ and not as T^4 , suggesting that either the inner radii changes dramatically or that the disk is irradiated by the thermal component changing its hardness factor. The power spectra reveal a Quasi Periodic Oscillation whose frequency changes from ~ 30 Hz to 50 Hz. The frequency is found to correlate well with the disk flux ratio. In the 3-20 keV LAXPC band the r.m.s of the QPO increases with energy ($\text{r.m.s} \propto E^{0.8}$), while the harder X-ray seems to lag the soft ones with a time-delay of a milliseconds. The results suggest that both the temporal and spectral properties of the source are determined by the geometry of the system which is characterized by the disk flux ratio and that the QPO has its origin in the corona producing the thermal Comptonized component.

Topic

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